ABSTRACT

A recovery plant for recovery of a gaseous component from a process gas has an absorber employing a lean solvent and a semi-lean solvent that absorb the gaseous component from the process gas, thereby producing a rich solvent, a semi-rich solvent, and a lean process gas. A regenerator extracts the gaseous component from the rich solvent, thereby regenerating the lean solvent and the semi-lean solvent. A solvent flow control element combines at least part of the semi-rich solvent and the semi-lean solvent to form a mixed solvent, and a cooler cools the mixed solvent that is subsequently fed into the absorber. In a method of removing a gaseous component from a process gas, a stream of lean solvent and a stream of semi-lean solvent are provided. In another step, the stream of lean solvent and the stream of semi-lean solvent contact the process gas in an absorber to produce a stream of semi-rich solvent and rich solvent. In a further step, at least part of the stream of semi-rich solvent and semi-lean solvent are combined to form a mixed solvent stream, and a cooler cools the mixed solvent stream, which is introduced into the absorber to absorb the gaseous component.